Medical Arts and Sciences: A Scientific Journal of the College of Medical Evangelists

Volume 3 | Number 1 Article 1

1-1949

Medical Arts & Sciences, Volume 3, Number 1, January 1949

LOMA LINDA, CALIFORNIA

MEDICAL ARTS AND SCIENCES

A SCIENTIFIC JOURNAL OF THE COLLEGE OF MEDICAL EVANGELISTS

VOLUME 3 JANUARY, 1949 NUMBER 1

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MEDICAL ARTS AND SCIENCES is published quarterly. The annual subscription price is as follows: domestic $2; Canadian $2.25. Add 15 cents for yearly subscriptions to countries requiring extra postage. Single copies are 50 cents, postpaid. Checks, money orders, and drafts should be made payable to the Review and Herald Publishing Association.

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Published quarterly for the College of Medical Evangelists, an institution operated by Seventh-day Adventists, and printed by the Review and Herald Publishing Association, Takoma Park, Washington 12, D.C., U.S.A. Domestic $2 a year, Canada $2.25, 50 cents a copy. Add 15 cents for yearly subscriptions to countries requiring extra postage.

MEDICAL ARTS AND SCIENCES is founded under a grant from *Life and Health* research funds of the Review and Herald Publishing Assn.

EDITORIAL

GRADUATE AND POSTGRADUATE MEDICAL STUDY

The far-reaching advances in medical practice in relatively recent years have materially modified medical education at all levels. Educational requirements for admission to medical colleges have been increased in time and scope. The undergraduate medical course has become more and more complex in respect to the extent and intricacy of factual data to be mastered and in skills to be acquired.

The complexity of modern medical practice has given emphasis to the need of continuous study and an ever-enlarging experience on the part of the physician who desires to remain professionally in step with medical progress.

The very complexity of practice, coupled with the desire to become particularly proficient in some branch of medicine or surgery, has led many physicians to limit themselves to a field of specialty practice. The formation of the American Boards for certification in medical specialties has given considerable emphasis and impetus to preparation for specialization.

Prior to the past three decades there was little formalized graduate instruction available to physicians desiring specialty training. Until relatively recent times much of the training was by preceptorship in a more or less haphazard fashion, supplemented by personal reading.

The demand for organized training programs and the setting up of standards of attainment for recognized specialty practices have led to the gradual development of educational facilities in medical centers to provide for approved graduate study and specialty training intended to span the period between the completion of a general internship and the completion of training required for specialty certification. This educational period is rightly systematized and standardized in harmony with accepted teaching standards on the graduate level, and must be such as to merit approval of the Council on Medical Education and Hospitals of the American Medical Association and the respective American boards of medical specialties.

In preparing for specialty practice it is generally accepted that at least six months should be spent in the study of the basic medical sciences including organized courses in anatomy, physiology, pathology, biochemistry, and other sciences ancillary to medicine.

In presenting basic sciences on the graduate level emphasis is to be given the fundamentals relating to and underlying clinical medicine and not upon the accumulation of didactic factual data. The basic science courses—and this applies to all graduate training—are not to be given or regarded as "cram" courses for American Board examinations. In view of the clinical emphasis to be given the basic sciences, the teaching should be supervised by teachers experienced in clinical practice.

In hospitals connected with medical colleges having basic science and clinical teaching staffs available for graduate teaching, the teaching

of the basic sciences may be integrated with the clinical experience associated with resident of fellowship appointments. However, because many desirable resident appointments are available in hospitals where provision for teaching the basic sciences is not feasible, there is need for organized graduate teaching in these fields in certain medical centers. The College of Medical Evangelists is offering courses in the basic sciences in recognition of this need and opportunity to serve its alumni and other graduates.

Many physicians in general practice are seeking continuation and part-time courses on the graduate level as a means of keeping professionally well informed and acquainted with advancing techniques and increasing skills which enhance the effectiveness of the physician's care of his patients.

Time was when a physician might become a self-styled specialist; and though courses taken and degrees acquired do not ensure knowledge and skill on the part of the practitioner, yet all agree that the standards of both specialty practice and general practice have been materially raised by the greater emphasis now being given to advanced study and postgraduate courses intended to keep physicians young professionally and alert to the gratifying advances being continuously made in the science and art of medical practice. The College of Medical Evangelists, through the varied courses offered by the Graduate School of Medicine and resident and fellowship appointments, is seeking to fulfill its mission and full responsibility in promoting and contributing to the advancement in medical education.

The majority of physicians recognize that they must remain continuously as students of medicine and devote no small amount of time and means to this end. The physician who does not, will soon find that the march of medicine has progressed far while he has been indolently standing by.

This need for constant growth in knowledge and skill is admirably brought to the Christian physician in the following counsel:

"The physician who desires to be an acceptable coworker with Christ will strive to become efficient in every feature of his work. He will study diligently, that he may be well qualified for the responsibilities of his profession, and will constantly endeavor to reach a higher standard, seeking for increased knowledge, greater skill, and deeper discernment. Every physician should realize that he who does weak, inefficient work is not only doing injury to the sick, but is also doing injustice to his fellow physicians. The physician who is satisfied with a low standard of skill and knowledge not only belittles the medical profession, but does dishonor to Christ, the Chief Physician."—*Ministry of Healing*, p. 116.*

H. M. WALTON, M.D.

* White, Mrs. E. G.: Ministry of Healing, Mountain View, Calif., Pacific Press Publishing Association, 1909.

MEDICAL ARTS AND SCIENCES

VOLUME 3 JANUARY, 1949 NUMBER 1

DIAGNOSIS AND TREATMENT OF CERTAIN REVERSIBLE DISEASES OF THE KIDNEY*

WALTER E. MACPHERSON, M.D.†

Among the diseases of the kidney, acute glomerulonephritis, albuminuric nephrosis, and so-called lower nephron nephrosis might be considered as conditions in which the renal decompensation is reversible.

Acute glomerulonephritis is truly an acute disease. It is one in which there appears to be a systemic reaction to a toxin produced by a current or a preceding hemolytic streptococcus infection with the kidney as the focus of such reaction. The symptoms and findings in a patient with a relatively severe acute glomerulonephritis are fairly clear and even distinctive. The first sign which a patient may notice is the sudden appearance of dark, cloudy urine. If one analyzes such a specimen, he finds the reasons for its peculiar quality. There are suspended within it large numbers of red cells and casts. If the urine is acid, the acid hematin from degenerated erythrocytes produces a dark, coffee color. Albuminuria is present, but the quantity of albumin may be relatively small as compared with the large number of cells. One might assume that the relative relationship between cells and albumin in the urine approximates the relationship of cells to albumin in the blood.

Usually there is a moderate increase in blood pressure, and probably due to an increase in systemic capillary permeability a mild to moderate generalized edema occurs, even though hypoproteinemia of sufficient severity to produce edema is not present.

Addis emphasizes the point that an attack of acute glomerulonephritis has a sudden onset. He compares it to an explosive incident, the most acute phase of which lasts for from four days to a week. A gradual recession occurs during the succeeding four to eight weeks. The peculiar color of the urine changes toward normal as do the number of cells and casts. The amount of albumin is gradually reduced, the blood pressure rather quickly drops to within normal limits, and the edema disappears. At the end of four to eight weeks normal urine is the rule among those patients who recover from the disease. At the same time no further symptoms or abnormal findings are present.

At this juncture mention should be made of the fact that the mortality from acute glomerulonephritis during the acute stage is relatively small. Probably it does not exceed 5 per cent. Nevertheless, one must consider the possibility that only about 50 per cent of patients who have had acute glomerulonephritis have a complete disappearance of the

* Read before the C.M.E. Postgraduate Assembly, February 27-March 1, 1949.

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disease with no future latent trouble. Therefore, even though the phase of acute glomerulonephritis disappears, approximately one half of the patients are not completely cured, and a chronic form of glomerulonephritis follows.

Concerning the acute phase, unfortunately neither children nor adults particularly concern themselves with the color of their urine; and due to the fact that the foregoing findings may be quite mild, many have had acute glomerulonephritis without its having been diagnosed or without its presence having been known.

The treatment of a patient who has acute glomerulonephritis is a subject on which there are varied opinions. When one recognizes that there are many people who apparently successfully emerge from an attack without having known that they had it, and therefore without having given any consideration to its treatment, one can legitimately question whether there is such a thing as a sound therapeutic program. Given a case of acute glomerulonephritis, however, the physician has two objectives in mind to which a system of therapy is directed. These are (1) to try to save the lives of those who might otherwise die of the acute disease, and (2) to try to prevent the development of chronic glomerulonephritis in a higher percentage than might otherwise occur.

Addis suggests the following:

1. For the first few days a diet low in sodium chloride and high in carbohydrates, with a maximum of from six to ten grams of protein per day.
2. Water as the patient wants it. Do not push it or restrict it.
3. After the first few days the patient may be placed on a well-balanced diet.
4. Bed rest is probably one of the most important therapeutic procedures; but because of the fact that so many of these people do not feel too bad, it is sometimes difficult, especially among children, to keep them there.

When the urine shows signs of clearing, and the edema disappears, the patient may be given some ambulatory privileges. Depending upon the progress of a given patient, he may gradually work into normal activity from four to eight weeks after the onset.

There seems to be no relation between the intensity of acute glomerulonephritis and the severity of a preceding streptococcus infection. Also, it appears as though bacteriostatic agents, such as the sulfa drugs, neither prevent nor cure the disease.

Concerning nephrosis, which is a term first suggested by Friedrich Müller in 1904 in an effort to differentiate degenerative lesions in the kidney from those of a truly inflammatory nature, the modern physician recognizes a complicated and inadequately understood situation. Since Müller excluded degenerative vascular lesions such as nephrosclerosis from the classification of nephrosis, the term has been erroneously used in such a way as to imply primary disease of the renal tubules. Based upon ample evidence, this viewpoint of nephrosis must be discarded. As a matter of fact, one can no longer assume that the term *nephrosis* includes a single specific kidney lesion. The time has already come when one must refrain from describing histopathological lesions under the blanket term of *nephrosis*. In the interests of scientific accuracy the time may eventually come when, in accord with suggestions already made by many, the term may be discarded.

In clinical circles a purely morphologic approach to the subject of nephrosis has been replaced by a more physiologic concept. The so-called nephrotic syndrome is now the common denominator in classifying the nephroses. Although an exact classification is presently not generally agreed to, the current belief and

teachings of most investigators are that four types of nephrosis are recognizable. These are (1) true or lipoid nephrosis; (2) the nephrotic syndrome of chronic glomerulonephritis; (3) amyloidosis; and (4) syphilitic nephrosis. Syphilitic nephrosis is so rare at the present time as to warrant its exclusion from the viewpoint of differential diagnosis.

There are differences of opinion as to whether a separate disease entity of true or lipoid nephrosis actually exists, and also as to just what stage in the process of glomerulonephritis the nephrotic syndrome obtains. For purposes of clarification Bell's[1] viewpoint of this situation is arbitrarily accepted. With the exception of tubular damage caused by toxic drugs or heavy metals, or by some metabolic disturbance such as is found in amyloidosis, or by the invasion of the tubules by an ascending infection such as in chronic pyelonephritis, tubular damage is secondary to glomerular disease. Assuming that in the human kidney the blood supply to the tubules is by way of corresponding glomeruli, one may easily understand how the blood supply to associated tubules can be diminished to the extent of causing tubular degeneration if the primary glomerular pathology is of a nature to diminish or stop blood flow. If the blood flow through a given glomerulus is completely occluded, a certain tubule in whole or in part might become functionless, depending upon whether the efferent vessel from a given glomerulus supplies a whole tubule or only part of one. In nephrosis, however, glomerular circulation, and therefore glomerular function, is usually quite good. As a rule, there is no gross evidence of impaired kidney function. The glomerular filter, however, shows an abnormal morphology and leaks serum protein, particularly serum albumin, which in the normal glomerulus does not pass through the filter.

From the viewpoint of the clinician, nephrosis, or the nephrotic syndrome, may be defined as a condition in which there are severe albuminuria, edema, decrease in plasma protein (albumin), increase in blood cholesterol, increase in susceptibility to infection, often a decreased metabolic rate, and an associated anemia. Bell differentiates between what is commonly called the pure form, or lipoid nephrosis, in which there is little or no hypertension or renal insufficiency, and which is most common among young children who apparently have not had acute glomerulonephritis, and a mixed form in which there may be a moderate degree of hypertension and renal insufficiency, and which follows acute glomerulonephritis.

When present, hypertension and renal insufficiency frequently go together and may be interpreted as representing kidneys in which glomerular circulation is impaired. Therefore, where there is no hypertension and no renal insufficiency, one assumes that the blood flow through the glomeruli is reasonably good, and that the amount of tubular damage would be neither severe nor extensive. The histological findings of this condition are in accord with such an opinion. If, however, the general picture or the nephrotic syndrome maintains, but in addition there coexists some hypertension and impaired function, one would assume that the blood flow through a considerable number of glomeruli is diminished. The histological findings in this situation also support such an assumption. This picture may be recognized as the mixed type of nephrosis.

According to Bell's[1] description, the morphology of nephrosis, whether it be with or without hypertension, shows the basilar membrane to be thickened; and it is assumed that this abnormal situation permits serum albumin to leak through with the filtrate. Thickening of the membrane eventually may produce capillary occlusions, the results of which are similar to the well-recognized chronic glo-

merulonephritis, in which there are hypertension and possible azotemia, and which is differentiated from the more common form of chronic glomerulonephritis principally in that the albuminuria is more severe and more persistent and the number of red cells in the urine is less.

The opinion that the nephrotic syndrome represents what might be called subacute glomerulonephritis does not have much backing, but eventually it may assume the more common form of hypertensive, azotemic, chronic glomerulonephritis. Except in those cases where glomerular occlusion occurs, tubular function remains good, and the fact that considerable amounts of lipoid may be found in the tubular cells cannot be interpreted as a reason for any interference with tubular function. According to the more rigid definition of lipoid nephrosis, there should exist no elevation of blood pressure, no impairment of kidney function, and no hematuria. However, upon careful examination it is not unusual to find some red cells in the urine.

Even though one might wish to follow along with those who believe nephrosis to be only a manifestation of glomerulonephritis, the general clinical picture remains the same. One could reasonably reconstruct the situation in a logical fashion as follows: After the acute attack of glomerulonephritis in which the urinary findings are particularly those of hematuria and casts with moderate albuminuria, one could assume that if there were not complete healing of the acute glomerulonephritis, one of two things might happen. First, the endothelium of the glomerulus might proliferate, thereby gradually causing capillary occlusion with the production of hypertension and azotemia. The other possibility would be the assumption that instead of having endothelial proliferation, a swelling of the basilar membrane occurs. This would give rise to proteinuria, hypoproteinemia, and eventually edema. In such a situation kidney function would remain relatively good. If the basilar membrane swells sufficiently, partial or complete occlusion of varying numbers of glomerular capillaries might occur, in which situation there would exist a diminution of kidney function and hypertension along with the albuminuria. This would qualify as the mixed form of nephrosis.

Briefly, in the general treatment of nephrosis feeding large quantities of protein does not readily change the serum protein level. Nevertheless, the fact that the patient needs protein to maintain normal metabolism, and the fact that he is losing relatively large amounts in his urine, are sufficient reasons to give him a reasonably high protein diet. It is the opinion of the author that the diet should be well balanced, and on that basis it is rather difficult to get a patient to eat more than 100 to 150 grams of protein per day. The protein should be adequate not only in quantity but also in quality. As long as edema exists there should be restriction of sodium. When edema is sufficiently severe, diuretics may be used. One of the mercurial diuretics, for example mercuhydrin at weekly or semiweekly intervals, is usually quite beneficial. Some consider urea as the diuretic drug of choice. It may be given without danger to the patient whose serum N.P.N. is within normal limits. Even though the serum cholesterol is high, it is questionable whether any definite benefit results from the use of thyroid. The intravenous use of whole blood is of value in restoring serum protein and in replacing red cells when anemia is present. When edema is severe and sodium restriction is indicated, albumin solution may be used with benefit. When the serum proteins reach a concentration of approximately 5.0 grams per 100 cc., edema usually disappears as long as other therapeutic measures are maintained. Unless there are

contraindications, it is desirable for the patient to remain ambulatory.

On such a regimen improvement is the rule, and eventually the patient may resume the activities of a reasonably normal life. When the patient has been under adequate control for an extended period of time, a remission may be sufficient to show evidence of quite normal physiology with a marked reduction in the quantity of albumin in the urine. One must always keep in mind the susceptibility of the nephrotic patient to infections. Early and adequate doses of antibiotics usually will control such situations.

Lower nephron nephrosis,[3] or acute toxic nephrosis, represents a reasonably well-identified clinical picture, the most noteworthy features of which are oliguria or anuria. Associated chemical and physiological changes result from such a renal shutdown. This condition follows one or more of a variety of precipitating causes, such as transfusion reaction, toxic drug reaction, such as with the sulfonamide drugs, and severe tissue trauma with or without vascular shock.

Strauss[8] describes the initial onset with symptoms of "nausea, vomiting, weakness, malaise, sometimes pain in the abdomen or back, and abruptly or insidiously, oliguria or anuria."

With the appearance of anuria or severe oliguria usually there is a rise in arterial blood pressure, a steady increase in the concentration of serum nonprotein nitrogen, possible edema, and a possible increase in the serum potassium concentration.

It is generally believed that in this condition morphological damage in the glomeruli is not significant. Nevertheless, according to the evidence presented by Trueta,[4,5] the initial disturbance seems to be a physiological one consisting chiefly of a severe vascular constriction which involves the interlobular and afferent vessels to the glomeruli in both kidneys, and thereby temporarily stops the flow of blood through glomeruli and the associated tubules. This could readily account for the sudden appearance of anuria or oliguria.

This phenomenon may last for a variable period of time; but frequently, by the time glomerular and tubular circulation are restored, significant tubular damage has already occurred. Morphological observations demonstrate degeneration of tubular cells which apparently fall into the lumina and mechanically occlude the tubules. If the hemoglobin or sulfonamide drugs are sufficiently concentrated in the filtrate, they may be precipitated in the tubules and further have a tendency to interfere temporarily with the flow of filtrate through them.

Many are of the opinion that the mechanical obstruction in tubules is of secondary importance in the production of oliguria or anuria and that the factor of primary importance is the extremely rapid reabsorption of all filtrate due to the absence of tubular cells. Regeneration of these cells begins in from 36 to 72 hours, and ordinarily develops to a point of being able to prevent such rapid reabsorption in from four days to approximately two weeks. At that time urine begins to appear. Thorn,[6] Kugel,[7] and others, report that after the onset of anuria, the average time for reappearance of urine is between the ninth and eleventh days. Some reports indicate that regeneration of tubules may occur as long as three weeks after the onset of anuria.

In this regard one becomes interested in how long a patient may live without the production of urine. There is evidence in support of the assumption that under what might be considered adequate and proper care a subject may live for as long as four weeks. If a patient with renal insufficiency such as is present with lower nephron nephrosis dies in less than three weeks, one becomes interested in the possible causes of death. Indications are

that relatively early deaths are due to (1) generalized edema, as well as pulmonary edema; (2) acidosis; (3) potassium intoxication because of hyperpotassemia. For those patients in whom tubular regeneration might occur, the immediate treatment should be directed toward keeping them alive as long as possible, or until diuresis begins. This means that edema should be prevented. Acidosis of sufficent severity to endanger life must be neutralized and toxic hyperpotassemia must be reduced. Even though there are some who support a hydration regimen as of therapeutic value, the present consensus is against it. In a state of anuria, and in the absence of significant sweating, an intake of from 750 cc. to 1,000 cc. of water will be required daily. Nothing should be given by mouth during the period of anuria, and sodium chloride intake should be prevented. The patient needs some calories, and therefore if the water and calories are given as a 15 per cent solution of glucose in distilled water, the problem of water and sodium chloride balance can be reasonably well handled.

If vomiting becomes a problem, the total quantity of vomitus should be measured, and an equivalent amount of isotonic saline can be added to the daily intravenous injection of the dextrose solution. If small amounts of urine are produced, this may be similarly measured, and the total quantity of water and sodium chloride can be added to the intravenous solution. Because of the fact that the foregoing treatment will contribute to cellular breakdown during the anuric phase, the potassium level in the blood may have a tendency to rise. Blood potassium levels should be checked daily, and electrocardiograms should be run at least every other day in order to observe possible toxic effects of potassium. If its concentration reaches a toxic level, or if acidosis occurs, these temporarily may be cared for by giving a liter of one sixth molar sodium lactate intravenously. Thereby the volume of extracellular fluid will be expanded, and this will help to dilute the toxic substances, and the sodium will help to replenish the alkali reserve. The author has observed symptoms of neuromuscular irritability in a patient with oliguria who was getting no sodium, and whose serum sodium level dropped during treatment, but whose symptoms cleared up promptly after the intravenous instillation of sodium chloride solution.

When the phase of diuresis occurs, quite large quantities of water and of the various salts are eliminated. Then it is particularly necessary to prevent dehydration and the excessive loss of sodium chloride. Water and salt in sufficient amounts to prevent dehydration will be required. After adequate regeneration of tubular cells has been accomplished, kidney function again becomes quite normal, and no further treatment is necessary.

Even though Hoffman, Marshall,[8] and others advocate excessive hydration as a means of diluting the accumulating toxic products of metabolism during the anuric or oliguric phase, the probabilities are that it is much easier to "drown" such patients during the anuric stage than to dehydrate them. As a matter of fact, the relative dehydration may be the essential lifesaver. During the phase of regeneration the urinary output may reach two or three liters daily, at which time the dangers of "drowning" a patient are quite remote or even impossible.

There will be those patients with lower nephron nephrosis who are anemic. As a matter of fact, many of them will be those who developed their kidney trouble because of a transfusion reaction from blood which was being given them to treat their anemias. Strauss [8] states that, after kidney function has been restored, transfusions of properly matched whole blood may be as safely given as to any other patient.

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REJECTION: SOME CAUSES, SYMPTOMS, AND TREATMENT

H. E. ANDREN, M.D.

One of the many causes of personality problems is the feeling of rejection. It may result in the individual's becoming hypersensitive, resentful, or demanding, particularly if this experience has occurred in the impressionable age of youth. It is my purpose in this paper to set forth some of the symptoms and responses that occur in the individual who has this feeling, and what avenues are open in the treatment of such maladjusted individuals.

A long story of repeated rejection is elicited on inquiring into the life history of a young woman patient. "Why am I so easily offended, so touchy, so easily discouraged and let down? Why do people affect me as they do?" she asks; then continues: "How well I remember, although I have never told anyone, what a strange, indescribable sensation I experienced when my stepmother said to a friend, in my presence, 'The good die young.' It occurred on my eighth birthday, and we had just buried my younger sister. By her attitude as well as her words I realized how I stood with my stepmother. My grief was enhanced by remorse. I didn't cry; I couldn't."

Through the years this girl reacted with similar strange feelings at slight provocation. She had been very close to her father after her mother's death and, although at a tender age, was aware of the stepmother influencing him against her. "Then came the day when father died. In my grief and indecisiveness, looking for some straw of consolation, I consented to marry an older man whom I did not love. I go my way; he goes his. I can smile, but I am never happy. There are no bosom friends, and I am desperately lonely."

Numerous similar life patterns could be related, illustrating how *rejection* affects individual personality development. One person becomes hypersensitive; another, resentful, bold, adamant, or demanding. These experiences of nonacceptance by family or friends send painful arrows deep into the individual's inmost consciousness and beyond. The least untoward stirring of the emotions rekindles the hurt, and a reaction mechanism is established. There may be oversubmissiveness or such overcompensation as seen in excessive aggression and other manifestations of hostility, whether conscious or unconscious. A certain amount of emotional blunting or immaturity is associated with either of these reactions, and some souls reach old age without acquiring a capacity for sound interrelationships and mature mental attitudes.

The importance of early environmental factors has received increasingly more attention in recent years, and it is well recognized today that rejection may take on various forms, all leaving the same feeling of being more or less abandoned, forgotten, or neglected. Oversolicitousness regarding the child's physical welfare may cloak a disinterest for his deeper needs with a superficial affection, interpreted by the child as an indication of not being wanted. He may well be right. Later in life this child will perhaps reveal inward sentiments typically expressed in words such as these:

"The more I know of men, the more I admire dogs."

"Love is the business of the idle."

One college student said, "The tendency

to analyze people carefully and coldly has made me feel withdrawn from normal life."

Another said, "My friendships are limited to those I care for. . . . Usually, if I dislike a person, I feel that I do so with justice. I feel that the few that dislike me are not really good themselves, for I feel that I am good and that people of discernment see and appreciate this feature in me."

In more mature years some recognize specific instances when rejection was experienced. One says: "Rebellion came shortly after I made a fool of myself at an initiation by almost breaking down, and I decided that henceforth I would be 'sufficient unto myself.' On that principle my life, up to very recently, has been conducted. I have had no real friend since the chap who introduced me into the society. I have met merely interesting individuals. I decided from then on that I was somehow different from the rest of humanity, vastly superior to boys my own age—much too singular a creature to be understood." [1]

The early dependency of the child is more or less exploited by some mothers, consciously or not, by doing things for the youngster. The mother may have every good intention, yet may distort the child's personality development by unconsciously appeasing her own neurotic guilt feelings. Unwholesome parental attitudes may vary from dangerous whims to overrigidity and cruelty. Belittling the child, ridiculing, nagging, teasing the boy or girl, and provoking wrath and perhaps subsequently punishing him for it are examples of such unwholesome attitudes that make it impossible for the child to express his inmost feelings. These nonverbalized inner experiences may consist largely of pent-up frustrations, a feeling of being goaded. The child feels the anger but cannot permit it to break through, for the parent is either "too good" or "too severe." The growing mind may be unable to break with these reaction patterns, and thus becomes vulnerable to insults of one kind or another throughout life. Inevitable life situations, such as loss of parents or wartime separation of families, for example, must be appreciated in their relationship to these frustration reactions of childhood. However, it seems next to criminal negligence for parents willfully and knowingly to subject their offspring to such undermining of self-respect and inward complacency as naturally follows the above unwholesome parent-child attitudes. Here is an unlimited field for preventive mental hygiene. Some think the Scriptures prescribe only filial obedience, forgetting the reminder: "Ye fathers, provoke not your children to wrath: but bring them up in the nurture and admonition of the Lord." [2]

There is an enormous need today for a parental educational program which will point out a middle-of-the-road policy in dealing with youth; a program which builds for acceptance and not rejection, stability and not lability, of emotions and character traits. Proper credit is rarely given to the child for his adaptability and his efforts to assume responsibilities. These are taken for granted, and increasing demands of his abilities, if beyond reason, naturally leave him defiant, tearful, or irritable.

Adults, too, meet experiences of rejection. Perhaps such an experience comes from a clear sky, with no earlier preparation or "conditioning," as in the type of case referred to above. This was seen often during the recent war, and it is seen frequently in this postwar period, both among the victors and the vanquished. During the drawn-out days of conflict or preparations for it, men broke down at times because of a sense of being abandoned, forgotten. Groups were found in isolated geographical areas, who comforted each other the best they could. In one instance they called themselves the Society of the Forgotten, each having had word that his wife had been un-

true. The knowledge that they could do nothing about it except to "grin and bear it" proved no special help. The absence of substitute channels of compensation and the increased feelings of isolation and lonesomeness led to eventual breakdown in many. The contrasts and extremes in climate, the perpetual daylight in the summer and the nearly perpetual darkness of the winter, as well as the fact that there was nowhere to go A.W.O.L., all added to the accumulated sense of frustration in certain remote areas and islands the world over, with variations in severity or monotony. The most stable personalities were made to feel the impact of these forces. Some fought it out for two, three, or more years abroad, to find a most difficult reaction pattern having gained a hold, one most obstinate and yet almost indefinable. The best description of this emotional reaction might be that of a sense of nonacceptance, leaving a hollow, vaguely impersonal mold to all feeling tones, irritability, oversensitiveness, and an unconquerable sense of "not belonging," with a sense of failure or a persistent fear of failure.

Fundamentally, these symptoms spell out the same word, *rejection,* and there may be other real causes for such a response. Perhaps the individual senses that he gave his all to the patriotic cause, sacrificing home, money, social pleasantries, even to the risking of his life, only to discover that in his absence others exploited the war situation or bettered themselves to a point where he is left "trailing the dust." Perhaps a deeply ingrained sense of personal pride detects a prevailing disregard of his just dues, yet postwar politics make it impossible to do anything about them.

In civilian life the complexities leading to "rejected" feelings are even greater than in such situations as described above. Like a rolling snowball, the feeling grows with age. As illustrated in the following case, one sees that the very reactions experienced by the person at hand were revealed by parents and grandparents in their general attitudes. The attitudes of the latter were certainly not inherited, but they were deeply ingrained in the young offspring of each generation. In this way elements of distrust and cynicism were handed down from mother to daughter and father to son, to be elaborated upon and increased in intensity with each child. Negative qualities became dominant; positive virtues exceptional.

CASE OF MISS P. A.

The present problem consists largely of persisting feelings of frustration, with episodes of restlessness and mild speech disturbances, with morning depressions, progressive, about two years duration.

Ever since adolescence the patient has had trouble with stammering. At the age of 18 or 19 she suffered with a "complete breakdown," when she lost her strength, was flat on her back for a period of nearly two years. After convalescence she kept feeling that she would always be better, but she realizes that she never was really strong, having frequent colds and lowered resistance in general. She always had a feeling of "nerves" in the morning, although working at home as a seamstress. By the end of 6 years she had developed quite a good-sized business. In 1941 her speech was very much improved and she felt fairly self-reliant and made many good contacts. In 1942 she became restless, and wanted to get a job outside the home. She took an elementary course in technology, majoring in drafting, and completed the course in two weeks. She then found a very satisfactory opening drafting yacht-fittings. She described her boss as being unusually kind and helpful and states that she loved her work for many years. The past year or two, however, she has begun to feel as though she were in a rut, that she has lost something in life; and now that she is 40 years of age, she feels that "nature has cheated her."

Miss P. A. feels that she takes after her father, and that her mother and the maternal relatives do not understand her. Her paternal grandmother, who lived in England, is thought to have made the father feel frustrated. He was a much "repressed" individual. His mother would show contempt and laugh at people's mistakes, with no feeling for them. She *"thought* things out but could not *feel* anything." The patient's father died at 65, of a stroke. He had a "twisted way of looking at things." When the patient was 6 years of age he caused her to feel that she was "pushed away." He had played ball with her in the yard one night, and she feels that he didn't play fair. She lost the game, and said something to him like "Darn you." He was insulted, and would not speak to her for many days. Finally, after some weeks, he condescended

to forgive her. He always held her away from him. Although later they would take walks together at different times, "there was always a barrier."

As the patient has no siblings, and her school life was rather difficult, she could not adjust well to the other children. The youngsters in the neighborhood "plagued her" before she started school. Six weeks after she had begun school she was taken out, having been told she was not well (coughing at night). She was out of school for two years, being taught at home. When 8 years of age, she was reinstated, but could never feel at ease with the other children. She developed a great craving for companionship, and at the present time experiences a feeling of chagrin that it was never possible for her to marry.

The maternal grandmother disliked having children, and the patient's mother, as well as a single aunt, experienced considerable feeling of never being loved. The mother of the patient is still living and well at the age of 76. As a child she was thought to be very delicate. She would "throw herself all over." This continued until adult life, and the patient believes that the father liked the mother's way of "posing." Mother would show a peevish expression and would refuse to do the housework for fear of soiling her hands. She made the patient feel extremely rejected, as she took little interest in her personal needs. The maternal aunt was very fond of the patient, but the patient did not return her affection. This aunt tried to give her gifts, but she could not be "moved by the gift." The aunt was a musician, like the patient's mother, and stammered a great deal. She would have "fits" if the patient showed any "daring" tendencies.

The patient describes the breakdown which she had in 1929 as follows: She had weighed 125 lbs. in 1928, was in excellent health except for an occasional attack of grippe. During the summer of 1928 she had experienced trouble with her eyes, so she couldn't focus. She felt like a "ton of lead" the next winter when skating. Her speech became worse, and she would cry all night, occasionally. At the age of 19, after one of these crying episodes while in art school, a doctor was called to see her. She had an elevated temperature and was ordered to bed. She states that she can recall "throwing a hysterical fit" in order to get rid of the first doctor, because she disliked "this old Scotchman." Dr. M. L., who was then just beginning his practice, was called in, and some injections were given. Her condition was thought to be due to grippe. She could not tolerate noises such as a clock. She was urged to get up that winter, but did not want to. When she finally did get up to sit in a chair, she sat there staring, and couldn't read. She felt as though she had had a stroke, and lay as if paralyzed after that. She states that she recalls being in bed for a year and a half, from March 1929 to December 1930. For six months during that time she went without menstrual periods. Although she ate well she could not improve in weight. The weight then averaged from about 100 to 110 lbs. She had marked insomnia, and there were frequent cardiac palpitations. Again in the summer of 1930 her mind seemed as if "blank." At the end of the summer she did not want to live. She states that she went through "all the symptoms of death," and on one occasion told the parents she was not going to live. Dr. M. L. was called, and he assured her that she would live. Immediately after this she decided to make an effort to put on weight, and in October she picked up a magazine for the first time in a period of a year and a half. She gradually became stronger, but there was frequent stiffness of the legs and back.

Following this illness there were stages of hypochondria, with much fear of fresh air, etc., because it might cause her to catch another cold. In general, however, she was in good health, and since has always maintained a "social consciousness," much more than her parents. The fact that she could not find friends made her feel very frustrated. Once or twice she had some dates with boys, but she would never pursue any intimate friendship. In more recent years, however, she cultivated a friendship with a young widower next door. He was rather irresponsible, and she could never marry him, she felt; yet in order to be a friend of his they had to be "intimate." She feels that he furnished her the emotional and physical needs for which she craved. She really wanted to marry another man on the same street, but could never make herself show an interest in him. She felt bad when she learned that later he had married another girl, one much inferior to her. During the past few years the mother has been withdrawn, and sits and cries over "Alice," an old lady who died in the late '30's, and whom the patient could not tolerate very well.

Examination of the mental status brings out a moderate amount of increased psychomotor activity with much pressure of thought, but there is not any true flight of ideas or any memory impairment. The patient is tense and occasionally shows some tendency to weep. She is in good contact and is normally oriented in all spheres. Insight and judgment are well preserved. Intelligence is high average normal. (Neurological findings were negative throughout.)

Impression

Psychoneurosis, chronic anxiety state, with reactive depression, in an inadequate personality with a strong background of rejection.

Then again, certain imaginary hurts may loom up, and the individual feels he is not accepted. This can lead to actual lack of acceptance, in time, so that true rejection is experienced.

What can be done for such an individual?

An ever-increasing need presents itself for a body of "educators" who might reach these frustrated personalities at their level and who could present their problem to them in a true

INJURIOUS EFFECTS FROM CONTACTS WITH MILLIPEDES

BRUCE W. HALSTEAD, M.D. and RAYMOND RYCKMAN*

Millipedes are probably among the least mentioned of the so-called "medically important arthropods." Perusal of a number of the more common texts dealing with the entomological aspects of medicine (Belding, 1942: 600, Craig and Faust, 1940:511, Herms, 1946: 539, Mackie, Hunter, and Worth, 1945:515) revealed the concept, which is commonly believed, that millipedes are not capable of producing injurious effects. A recent experience of the senior author and additional investigation by both writers have prompted the writing of this paper in an effort to broaden scientific thinking regarding the medical significance of this animal.

Report of Case

At the Montemorelos Hospital y Sanatorio, in Montemorelos, Nuevo Leon, Mexico, on September 4, 1948, one of the workers of the institution complained of a skin rash which she said had been produced by a millipede. The patient stated that she was awakened that morning by an intense burning sensation on the inner aspect of each leg. Upon examining the area, she was surprised to discover a well-developed skin eruption. Thinking that the rash might have been produced by an insect, she searched through the blanket in which she had been sleeping and discovered a tightly coiled millipede (see illustration). The patient was fully convinced that this was the animal that had caused her trouble. The victim's bed consisted of a blanket spread on the floor of her house. Aside from the burning sensation, the patient did not complain of any other discomfort and denied having a history of allergy.

The patient was a twenty-four-year-old Mexican female who, aside from the rash, appeared to be enjoying excellent health. Examination of the lesion revealed a maculovesicular skin eruption covering an area of approximately four square inches, located on the inner aspect of each leg immediately below the region of the knee. The lesions ranged from small reddened blotches about the size of a quarter, with poorly defined borders, to sharply defined semilunar marks (see illustration). The semilunar markings varied in color from reddish macules to darkly pigmented vesicles. Tactile investigation of the pigmented vesicles gave the impression of the overlying skin being thickened, or hardened. Comparison of the morphological contours of the millipede with the general configuration of the semilunar markings revealed them to be quite similar. The healing process was uneventful and completed in about twelve days. After one month the woman still had dark colored areas which were barely discernable. No therapeutic measures were applied.

Because there was still doubt as to the etiology of the lesion, the arthropod, which was still alive, was placed on the volar surface of the right forearm of the senior writer and strapped into place with adhesive tape. The millipede was left on the arm for a total of thirty minutes. During the first ten minutes there was no discomfort; shortly after there was a sensation similar to that received from placing a drop of weak acid on the skin. There were no other symptoms, and the burning ceased shortly after removing the millipede. Scrutiny of the lesion revealed a semilunar, pigmented, vesicle surrounded by a reddened macular area having a diffuse border (see figure). The lesion on the arm of the writer was identical in appearance to some of those lesions seen on the patient.

While the millipede was still on the investigator's arm it was observed that small droplets of a brownish-colored fluid were being secreted by the millipede near the junction of the legs with the body. The fluid had a mildly disagreeable odor.

The lesion on the investigator's arm healed in about ten days. After an additional two weeks all traces of the episode had disappeared.

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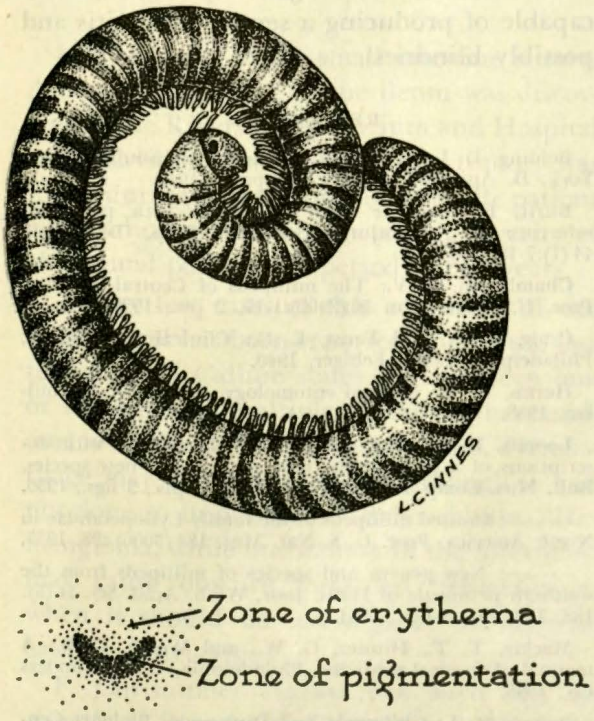
The arthropod was sent to Dr. R. V. Chamberlin, of the University of Utah, for identification. Unfortunately, the specimen was a juvenile form; and because final identification depends upon comparative studies of the adult male genitalia, it was impossible to render a decision beyond the generic determination of *Orthoporus*.



Millipede (*Orthoporus* sp. juv.). Below, the appearance of a lesion of the forearm produced by contact.

GENERAL DISCUSSION

Millipedes are arthropods belonging to the class Diplopoda. They are commonly confused by the layman with centipedes, which belong to an entirely different group, the class Chilopoda. Diplopods may be further described as having long cylindrical bodies with two pairs of legs and two pairs of spiracles for each of the greater number of body segments. Chilopods differ from millipedes in having a flattened body, a single pair of legs, and one pair of spiracles for each segment. Furthermore, the specialized poison claws which are present in centipedes are absent in millipedes. Diplopods are principally vegetarian in their feeding habits and do not produce their injurious effects by biting. Centipedes are carnivorous, and are capable of inflicting painful bites which, in the case of the larger tropical forms, may result fatally. Both groups prefer living in a moist terrestrial habitat.

The Diplopoda have been divided into two subclasses: the Pselapognatha, in which the repugnatorial glands are absent; and the Chilognatha, in which the repugnatorial glands are present (Burtt 1947:8). There are other morphological features which are taken into consideration, but this one anatomical difference will suffice for a dissertation of this type. It is the presence or absence of these glands which makes it possible for millipedes to produce their injurious effects. Hence millipedes, which are of medical importance, are members of the subclass Chilognatha. The text by Smart (1944:255) is one of the few reference works on medical entomology to make mention of the irritative ability of the repugnatorial fluid of these animals.

An excellent review of the literature regarding the harmful effects of the exudate of millipedes has been written by Burtt (1947:1-8). The author points out "the fact that contact with this fluid may cause injury of a serious nature is not widely recognized." It is interesting to note that injury from diplopods does not necessarily depend upon actual contact with the organism. He lists instances where various members of the Juliformia which includes such genera as *Julus, Spirobolus, Rhinocrichus* and *Spirostreptus,* have been known to squirt their repugnatorial fluid a distance of several inches. Loomis (1941:192, 193) has observed *Rhinocrichus latespargor* Loomis discharging its secretion a distance of twenty-eight inches on one side and thirty-three inches on the other.

The first recorded injury produced by the exudate of millipedes was probably that experienced by Loomis (1936:70, 71) while he was collecting diplopods on the southern peninsula of Haiti. He received a discharge of fluid from a large specimen of *Rhinocrichus lethifer* Loomis, from a distance of eighteen inches, on his face, and area about the left eye. The eyelid and cheek became swollen and remained so for several hours. The pain was described as an intense burning or smarting sensation. A day later the injured areas became dark brown and vesicular. The vesicles persisted for about one week. Healing was uneventful and without scarring.

Although in the preceding case there was no injury to the eye, for it was probably protected by the action of the lid, it is a well-known fact among the natives of Haiti that this species of millipede is capable of producing permanent blindness among chickens and other small animals.

SUMMARY

The writers of this paper are of the opinion that entomologists should broaden their concepts regarding the medical significance of millipedes. A case of vesicular dermatitis is reported which was conclusively proved to be the result of a contact with the repugnatorial fluid of a diplopod of the genus *Orthoporus* juv. The incident occurred in Montemorelos, Nuevo Leon, Mexico. The only symptom was an intense burning of the lesions. Healing was uneventful and was completed in about twelve days after contact with the arthropod. The patient continued to bear pigmented areas at the site of the lesions one month later.

Brief mention is made of an article by Burtt regarding the injurious effects of the repugnatorial fluid of millipedes. Certain species of diplopods are definitely of medical importance. Some of the larger tropical forms are capable of producing a severe dermatitis and possibly blindness.

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The authors wish to extend their sincere appreciation to Dr. R. V. Chamberlin, of the University of Utah, for his identification of the millipede; and to Mr. Horace Kelly, of the Montemorelos Hospital y Sanatorio, for his cooperation in supplying the follow-up information regarding the patient discussed in this report.

CAVERNOUS HEMANGIOMA (CAVERNOMA) OF ILEUM

J. MARK COX, M.D.

Hemangioma of the small intestine is rare. A case of cavernoma of the ileum was discovered at the Riverside Sanitarium and Hospital at Nashville, Tennessee. This tumor was found during a laparotomy on a female patient who had complained of increasing severity of abdominal pain over a period of two years.

A very few cases of this condition of the small bowel has been reported during the last ten years. McCallum states, "I have seen one or two cases of multiple cavernous hemangiomata in the walls of the intestines. Hemorrhage may occur from these, although it had not done so in our cases." Babcock says, "Hemangioma, while uncommon in the intestines, may cause obscure intestinal hemorrhages, when it should be removed by excision or cautery destruction."

F. Christopher reports one such case in *Annals of Surgery* of December, 1942. R. J. White reports a case of hemangioma of the terminal ileum in the *Southern Surgeon* of December, 1941. Carbonell Salazar reports two cases of angioma of the small intestine in *Bol. Soc. Cubana de Pediat* of May, 1939. P. Amundsen reports a case of multiple hemangiomata of the gastrointestinal tract in *Norsk Mag. F. Laegevidensk* of March, 1938. F. Klein reports a case in *Centralbl. F. Allg. Path. u. Path. Anat.* of February 29, 1936. L. U. Acherman reports one case in *Am. Jr. Cancer* of August, 1937. F. T. Merchant reports hemangioma of the jejunum in *Arch Surg.* of December, 1939.

Report of Case

A forty-three-year-old Negro female complained of a griping pain in the midline of the lower abdomen and back of two years' duration. The pain had increased in severity and was worse in the morning and at night. For one year she was nauseated each morning and vomited occasionally. This nausea was associated with epigastric pain. Two times before admittance she noticed her feces were mixed with dark red blood. The patient went to various physicians and received various diagnoses. She was admitted to the Riverside Sanitarium and Hospital at Nashville, Tennessee, on December 4, 1944. Examination revealed tenderness over the lower lumbar spine on beating and mild tenderness in the epigastrium. A great deal of tenderness was present in the midline of the lower abdomen. No rigidity or palpable mass was noted. The routine laboratory tests were normal. The patient had not menstruated for eleven months.

A laparotomy was performed on December 6, 1944, in light of the increasing severity of abdominal pain and lack of a specific symptom complex. Ethyl chloride and ether anesthesia were employed. A midline incision was made and the abdominal contents exposed. The uterus was about the size of an orange. The gallbladder, stomach, spleen, kidneys, liver, and large bowels were normal. The ileum had seven inches of its surface covered with many dilated, dark, and tortuous vessels, many of which were thrombotic. Large hematomas could be palpated within the lumen. The area of the tumor was resected, and the two ends of the gut sutured closed. The intestines were united by a side-to-side anastomosis. The defect in the mesentery was closed. No nodes were palpable at operation. The abdomen was closed after removal of the appendix and instillation of sulfanilamide crystals.

Twelve hours after operation a Levine tube was introduced into the stomach and some fluid removed. Fluid was removed by Wagenstein suction each time the patient had the least discomfort. One thousand cc. of 5 per cent glucose in normal saline and 2,000 cc. of 5 per cent glucose in distilled water were given in three doses daily intravenously for four days. Twenty-five cc. of amino acids were given in each dose. The Levine tube was removed on the fourth day, and water was given to drink. The clips were removed on the fifth day, at which time surgical liquids were given and continued for five days. Mineral oil was

given nightly, beginning on the fourth day. The temperature did not go above 100° F., and the abdomen did not become distended.

The pathological specimen was seen by two pathologists—Dr. J. R. Cuff, of Meharry Medical College; and Dr. C. E. Kendall, of Madison Sanitarium. They examined the specimen grossly and microscopically. They report that the specimen consisted of twelve centimeters of small intestine and a moderate amount of mesenteric fat. The tissue was relatively soft. The lumen was not dilated, and when opened showed polypoid masses that were dark reddish brown and varied from 0.8 to 1.3 cm. Many areas of hyperemia and acute ulceration were noted. These followed the transverse axis of the specimen and corresponded with the areas of fibrin seen on the surface. The wall was slightly thickened. The serosa was pink and showed dilated blood vessels that were filled with blood clots. Beneath the mucosa there were several raised, firm nodules, the cross section of which showed beginning organization by fibrin tissue.

The microscopic appearance (Dr. Cuff) showed the mucosa intact. Groups of vessels in the submucosa showed dilatations simulating those seen in the cavernous type of hemangioma. In one section a circular calcified mass was seen at the base of this dilated group of vessels. In other areas a linear perivascular distribution of lymphocytes was present. Occasional vessels showed complete obliteration of the lumen by fibrous connective tissue which was not concerned with an organizing process. Other vessels showed acute proliferation of the subendothelial connective tissue, while the vessels in the mesenteric fat showed the characteristic picture of the slowly developing type of proliferative arteritis. A portion of lymphonode showed no unusual change.

The acute degenerative changes mentioned in the gross description did not appear in the sections, but the polypoid masses were seen to contain much blood and showed many trabeculations. The diagnosis of Dr. Cuff was cavernous hemangioma and proliferative arteritis. Dr. Kendall states that the mucosal layer showed only fairly normal appearing crypts separated by fibrous tissue that contained small round cell infiltration and a moderately diffuse infiltration with eosinophiles and a few polymorphoneuclears. The submucosal and muscular layers contained many blood vessels whose walls appeared to be somewhat thickened by fibrous tissue, and the lumen of the blood vessels was distended with hemorrhage. There was no evidence of malignancy or specific lesion. The diagnosis of Dr. Kendall was hemangioma of the ileum.

In June, 1946, when this patient was again seen she was entirely relieved of symptoms and had gained weight.

CONCLUSION

1. An unusual case of cavernous hemangioma of the ileum is described.

2. The symptom complex of griping lower abdominal pain in the midline and back, nausea, occasional blood in the stools, and midline abdominal tenderness should bring to mind the possibility of intestinal hemangioma.

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SCIENCE AND SCRUPLES

Francois Magendie (1783-1855) and Sir Charles Bell (1774-1842)

CLARENCE W. OLSEN, M.D.

In the early part of the nineteenth century there began a scientific controversy that has never been finally settled and, in fairly close connection with this, an ethical controversy that still flares up at intervals to the present day. An anatomist in London and a physiologist in Paris each claimed priority in an important neurological discovery. The anatomist, whose father was a minister, introduced into the dispute scruples against inflicting pain; whereas the physiologist, whose father was a surgeon, was cited as a horrid example of the ruthless and sadistic experimenter on living animals.

The discovery, for which credit was disputed by Charles Bell in London and François Magendie in Paris, is the function of the spinal nerve roots. The Bell-Magendie law, as the formulation of the function of spinal nerve roots is sometimes called, has been compared in importance to the discovery of the circulation of the blood. The law states that the ventral roots are motor and the dorsal roots sensory in function.

The disputants in the controversy were Charles Bell, an anatomist and surgeon, and François Magendie, a physiologist and physician. Bell, artistically inclined, laid more emphasis on form, but Magendie liked experiment. As we shall see, the personalities of the two men are of great interest.

Bell's attitude toward any experiment which inflicted pain was to dispense with it if at all possible, although he did plan a number of classical animal experiments, some of which he performed himself. He was equally reluctant to inflict pain on human beings and, as a surgeon, was noted for his small incisions.

His comments on experimentation are characteristic of his attitude. He speaks of "delaying long because of the unpleasant nature of the operation" and being "deterred from repeating the experiment by the protracted cruelty of the dissection." In 1822 he wrote: "I should be writing a third paper on the nerves, but I cannot proceed without making some experiments that are so unpleasant to make that I defer them. You may think me silly but I cannot convince myself that I am authorized in nature or religion to do these cruelties—for what? for anything else than a little egotism or self aggrandisement?" On one occasion he used an animal which had been rendered insensible by a blow on the head. Because the animal was unconscious some important observations were impossible. Bell went as far as to say: "Experiments have never been the means of discovery and a survey of what has been attempted of late years in physiology will prove that the opening of living animals has done more to perpetuate error than to confirm the just views taken from the study of anatomy and natural motions"; and again: "I feel a hesitation when I reason upon other ground than on the facts of anatomy. Experiments are more apt to be misinterpreted."

Magendie, in contrast, boldly asserted: "Not one of the facts which compose the physiology of today has been proved or could have been proved except by experiment." He was an experimenter on a grand scale. He made use of the lesson of one experiment to plan a more perfect succeeding experiment. He was

admittedly rash in satisfying his curiosity during operations on human beings. This helps to explain why later, when anesthesia was introduced into the practice of surgery, he opposed it. "Pain?" he said. "Pain is one of the prime movers of life. As for myself, I should never allow my body to be handed over to a surgeon in a defenseless state."

Regardless of the relative advantages of the study of form compared with experiment on living tissues, Magendie came nearer the truth than Bell did when trying to discover the meaning of the spinal nerve roots. This seems to have as much to do with the preconceived idea which each had as with the method used. At the time of his investigations, Bell was imbued with the most comprehensive idea of the nervous system yet known. He was concerned with both sensorimotor functions and what he called "inner vital" functions. He had the germ of a conception of the automatic nervous system. His experiments, which were limited in number and in scope, led to observations which he was able to fit into the frame of his brilliant speculations, and he was only partly right. It is to be admitted that Bell's writing was a little difficult to understand and, even with a smattering of French, it is easier to understand Magendie. The latter was by philosophy a mechanist, primarily interested in sensation and motion, and not at the time of his discovery preoccupied with any idea about vital functions. Magendie's simpler idea proved to be right, so far as sensory and motor function are concerned.

Even though Magendie seemed to have no scruples about inflicting pain upon animals, he was truly sympathetic with human suffering. He was known to give money as well as medicine to the poor. He had little confidence in many of the remedies that were in vogue, largely limiting his prescriptions to medicines that he had investigated experimentally. He would give no treatment whatever in cases that he did not understand. He was often delegated by the Academy of Sciences to visit its ailing members. These scientists probably wanted no hocus pocus when they became patients.

Bell, scrupulous as he was in some matters, did a rather strange thing in his scientific reports. He altered and clarified his writings from time to time, so that they were more accurate and impressive in their revision than in their original form. At first his corrections were confined to conclusions; later they were introduced into descriptions of his experiments. He failed to indicate definitely that he had made any changes, so that unsuspecting readers believed they were studying verbatim reprints, and did not know of the revisions. Magendie detected this practice and observed, "Why does he harbor pretentions to discoveries which he has not made?" In this respect Bell displayed the amazingly naïve behavior so puzzling to see in unquestionably honest people.

An interesting quirk of Magendie's was his habit of completing an investigation before consulting the writings of others. He more than once enjoyed the thrill of discovery, followed by the chagrin of finding that his discovery had been anticipated. His custom was to reprint the prior report in his *Journal of Physiology*.

Bell's claim to priority in discovering the functions of the spinal nerve roots rose out of the fact that in 1809 he had had printed a pamphlet with the title *A New Idea of the Anatomy of the Brain, Submitted for the Observation of His Friends* (London, Strahan, and Preston), and in this pamphlet he had referred to the functions of these roots. He said: "I found that injury done to the anterior portion of the spinal marrow convulsed the animal more certainly than injury done to the posterior portion," and "on laying bare the roots of the spinal nerves I found that

I could cut across the posterior fasciculus of nerves, which took its origin from the posterior portion of the spinal marrow, without convulsing the muscles of the back; but that on touching the anterior fasciculus with the point of the knife, the muscles of the back were immediately convulsed." However, his conclusion seemed to be that the anterior roots were motor and sensory (sensible) and that the posterior roots served to govern vital functions (insensible, in Bell's original terminology). This reasoning came from the fact that Bell thought the cerebellum had to do with vital functions, and that the posterior columns of the spinal cord seemed to connect with the cerebellum, whereas the anterior columns could be traced down from the cerebral hemispheres, where Bell rightly assumed sensation and motion were seated.

The first intimation of Bell's idea was in a letter to his brother George. In this letter, dated 1807, he wrote, "I have done a more interesting nova anatomia cerebri than it is possible to conceive." Bell always gave 1809 as the date of his printed report, but historians now assign the actual date as 1811. The uncertainty is because the publication bears no date. The three known surviving copies are now treasured in libraries. One is in the Army Medical Library in this country.

Magendie's claim to the same discovery is based on a report published in his *Journal of Physiology* (J. de physiol. exper. et path. 2:276-279, 1822). Utilizing "a litter of 8 little dogs, aged 6 weeks," he made experiments which led him to "regard as probable that the posterior roots of the spinal nerves might have functions different from those of the anterior roots and that they were especially connected with sensibility. The posterior roots appear to be more especially appropriated to sensation, while the anterior appear to be especially associated with movement."

By October, 1822, Magendie had heard of Bell's claim to priority, and he said he could not have known of Bell's ingenious ideas since they had not been published. "The fact that the anterior (roots) are destined for movement while the posterior belong more particularly to sensation would appear to have escaped him. He, led by his ingenious ideas, had been very close to discovering the functions of the spinal roots."

It should be mentioned that in 1821 John Shaw, Bell's brother-in-law and associate in teaching, visited Magendie and gave some demonstrations. He also left with Magendie a copy of a dissection manual which contained a footnote referring to some experiments in progress which might have had to do with the spinal nerve roots but not giving the conclusions drawn. Whether Shaw and Magendie discussed this problem we are not sure.

It will be interesting to point out some similarities in the two scientists. In 1811, the year of his marriage and we believe also of his famous report on his "New Idea" of the nervous system, Bell was 37 years old. Magendie, in 1822, when he published his observations on the spinal nerve roots, was 38. Both men became famous and successful and received the customary honors bestowed on men of achievement in their respective countries. Yet both had a hard struggle at first. Their early education was informal rather than formal, although in the end both were gentlemen of learning and distinction. Each passed through a period of melancholy when on the threshold of success. Bell, who invading London from Edinburgh arrived in London on a Sunday after a trip of five days, found the city very depressing. He suffered rebuffs that would have discouraged most men. Magendie, when earning barely enough to sustain himself and his dog, began to think he suffered from a deep-seated incurable disease, and informed his friends that he would soon die. However, a legacy of 20,000 francs cured the melancholy.

He may have learned then that in some cases money is the best medicine. Both men were high tempered, especially when arguing about their scientific interests. Bell on one occasion thought it necessary to correct an impression (which was probably quite a general one) that he was pugnacious and sarcastic. Magendie sometimes acted as if he had invented the science of physiology, and was subject to rages when he thought someone was invading his province. Although both married, neither had a child; their creative energies seemed to be pre-empted by science. Both died with heart disease. Bell, who was so sensitive about pain, suffered from angina pectoris. Magendie, who rather approved of pain, also had heart disease, and his share of pain too.

The controversy which waged between Magendie and Bell seemed to bring out the most regrettable characteristics of two generous, talented, and successful scientists.

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BOOK REVIEW

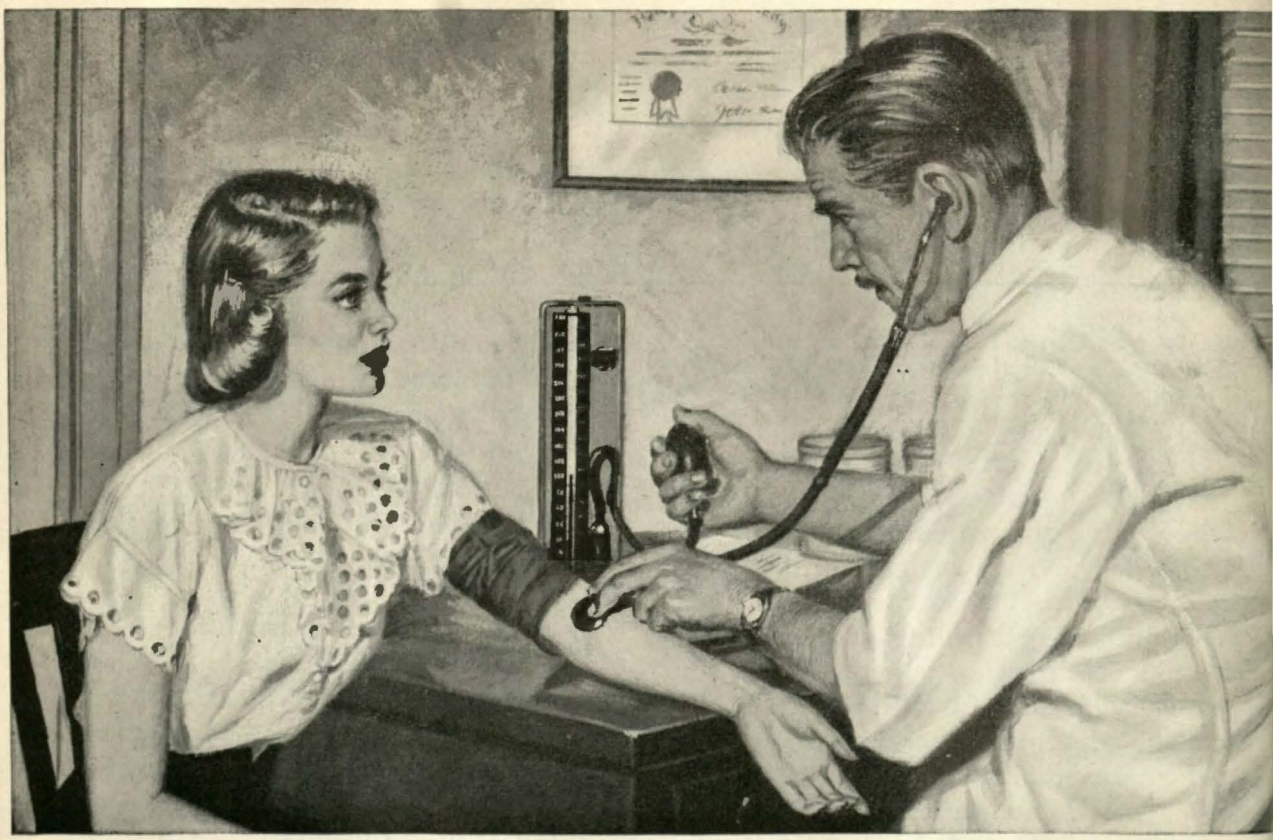
The Story of the Johns Hopkins, by Bertram M. Bernheim, M.D. 235 pages, cloth bound, $3.50. New York: Whittlesey House, McGraw-Hill Book Company, Inc., 1948.

This book, a most fascinating account of "four great doctors and the Medical School they created," was written by Dr. Bertram M. Bernheim, himself a member of the staff of Johns Hopkins for many years. Dr. Bernheim's forthright statement of facts as he observed them throughout a period of fifty years of association there, his keen analysis of problems of growth and development both past and future, and his honest expression of his own views add human interest to what otherwise might be a purely historical account of the rise of a great American institution. As Dr. Bernheim states in his preface: "I have made conscious effort to take the objective viewpoint but have not hesitated to explain, evaluate, take some slight license in order to round out the story, give opinion, enter into the picture, and even criticize when I thought it advisable."

Dr. Bernheim gives the Doctors Welch, Osler, Halsted, and Kelly the credit and honor they so rightly deserve in connection with the establishment of the Johns Hopkins and the growth and acceptance of scientific medicine in America, as well as raising the standards of medical education to the high level of today. He does not leave out the valuable contribution made by other such outstanding men as Mall, Howell, Abel, Cushing, and many others.

This is a book which will be of particular interest to those in administrative work of the medical profession. The story of great men with a great vision, makes for enjoyable reading. Of particular interest are those chapters in which he tells of the establishment of the various clinics that have become so outstanding, and, although of a controversial nature, his decisions and opinions on the full-time teacher of medicine and the future of nursing education. He points out the many ways in which Johns Hopkins branched out under the leadership of these great men, and in particular under Dr. Welch, who blazed a trail in medical education in the establishment of a new program of resident training and in accepting women students on the same basis as men.

For sheer pleasure and relaxation in medical reading we would stress again the great human interest to be found in this story as recorded by a man who has rare ability to bring out the "color and flavor at the Hopkins" as well as its scientific achievements and development.



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